

## ABSTRACT

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A system and method for non-invasive biomedical optical imaging and spectroscopy with low-level light is described. The technique consists of a modulated light source coupled to tissue to introduce excitation light. Fluorescent light emitted in response to the excitation light is detected with a sensor. The AC intensity and phase of the excitation and detected fluorescent light is provided to a processor operatively coupled to the sensor. A processor employs the measured emission kinetics of excitation and fluorescent light to "map" the spatial variation of one or more fluorescence characteristics of the tissue and generate a corresponding image of the tissue via an output device. The fluorescence characteristic may be provided by exogenous contrast agents, endogenous fluorophores, or both. A technique to select or design an exogenous fluorescent contrast agent to improve image contrast is also disclosed.